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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,295	04/26/2006	Leendert De Bruin	NL03 1257 US	4965
24738 7590 08/19/2009 PHILIPS INTELLECTUAL PROPERTY & STANDARDS PO BOX 3001 BRIARCLIFF MANOR, NY 10510-8001				
EXAMINER				
BEMBEN, RICHARD M				
ART UNIT		PAPER NUMBER		
2622				
MAIL DATE		DELIVERY MODE		
08/19/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/577,295

Applicant(s)

DE BRUIN ET AL.

Examiner

RICHARD M. BEMBEN

Art Unit

2622

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,5 and 7-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5 and 7-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1, 2, 4, 5 and 7-12 are have been considered but are moot in view of the new ground(s) of rejection.
2. Please note that the previous Office Action dated 25 February 2009 was non-final.

Specification

3. Examiner acknowledges and accepts the amendment to the specification dated 22 May 2009.
4. Examiner acknowledges and accepts the amendment to the abstract dated 22 May 2009.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 12 is rejected because claim 12 recites the following limitations:

"the plate of transparent material" in line 16;

"radiation opaque layers" in line 17;

"apertures" in line 17;

"grooves" in line "21".

There is insufficient antecedent basis for this limitation in the claim.

7. Claim 12 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In addition to the insufficient antecedent basis discussed above, this claim still unclear. For example, are the "grooves" in lines 21 and 23 the same grooves and therefore both lack antecedent basis? What is the "plate of transparent material"? the "radiation opaque layers"? etc. Please clarify the claim language or explain its meaning.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. **Claims 1, 2, 4, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub. No. 2001/0012073 A1 filed by Toyoda et al., hereinafter "Toyoda", in view of US Patent No. 7,453,509 B2 issued to Losehand et al., hereinafter "Losehand".**

Regarding **claim 1**, Toyoda discloses a camera module comprising:

a housing ([0003] and Figure 8, "105") containing a solid-state image sensor with a radiation-sensitive surface ([0003] and Figure 8, "104"), and a first optical element located above the solid-state image sensor ([0003] and Figure 8, "103") and the housing forming a shield against laterally scattered radiation to protect the radiation-sensitive

surface (inherent that "105" is opaque), a second optical element located between the first optical element and the solid-state sensor ([0003] and Figure 8, "101"), and a spacer between the first optical element and the second optical element ([0003] and Figure 8, "110"), the second optical element having a lens located above the radiation sensitive surface ([0003] and Figure 8, "101"), wherein the spacer is located adjacent the lens for supporting the first optical element (Figure 8); and

the housing includes a disk-shaped body with a primary radiation-opaque area (hatched portion of Figure 8, "105") and a secondary radiation-transparent area (Figure 8, "102") located within the primary area, the secondary area is located above the radiation-sensitive surface of the sensor and wherein a surface close to the sensor is smaller than a surface remote from the sensor (Figure 8); and

the first optical element includes at least one plate of transparent material having two sides (Figure 8, "103").

Toyoda further discloses an aperture wherein a side close to the sensor has a smaller surface area than the side remote from the sensor (Figure 8, "102"), a conical aperture created by the housing.

However, Toyoda does not disclose that each side of the first optical element is covered with a layer of radiation-opaque material (ROM), and an aperture is defined in the at least one plate; that the aperture in the ROM layer deposited on a side of the at least one plate close to the sensor has a smaller surface area than the aperture in the ROM layer on a side of the at least one plate remote from the sensor; and that the primary radiation-opaque area and the secondary radiation-transparent area are defined

by portions of the plate of transparent material sandwiched between the radiation opaque layers and the apertures therein, respectively.

Losehand discloses a camera module (refer to c. 8, l. 55 – c. 9, l. 26 and Figure 3) comprising a first optical element (c. 8, l. 59 – c. 9, l. 13 and Figure 3, "transparent block 44") wherein each side of the first optical element is covered with a layer of radiation-opaque material (ROM) defining an aperture (Figure 3, "transparent block 44" is covered on a top surface by "3" and on a bottom surface by "37", forming an aperture "14"). Losehand further discloses that the aperture in the ROM layer deposited on a side of the first optical element close to the sensor has a smaller surface area than the aperture in the ROM layer on a side of the at least one plate remote from the sensor (refer to Figure 3, "aperture 14" is smaller than the opening at top for "protuberance 31") and that a primary radiation-opaque area and the secondary radiation-transparent area are defined by portions of the plate of transparent material sandwiched between the radiation opaque layers and the apertures therein, respectively (c. 9, ll. 22-26 and Figure 3, opening at top for "protuberance 31" and c. 8, ll. 66-67 and Figure 3, "aperture 14"). Therefore, Losehand discloses a conical aperture formed by thin layers of radiation-opaque material on a transparent plate/optical member.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the conical aperture disclosed by Losehand, i.e. an aperture formed by thin layers of radiation-opaque material on a transparent plate/optical member, to form the conical aperture in the camera module, i.e. in an optical element such as "103" as opposed to in the housing, disclosed by Toyoda. One would be motivated to do so

because the process of creating the aperture disclosed by Losehand is simple, economic and could be easily implemented in all semiconductor fabrication facilities.

Regarding **claim 2**, refer to the rejection of claim 1 and Losehand further discloses that the first optical element includes a single transparent plate whose upper and lower surfaces are both covered with a radiation-opaque layer in which circular and concentric apertures are provided (refer to c. 8, l. 55 – c. 9, l. 26 and Figure 3).

Regarding **claim 4**, refer to the rejection of claim 1 and Losehand further discloses that the transparent material includes a glass or a synthetic material (refer to c. 8, l. 61: "homogeneous block made from transparent plastic").

Regarding **claim 7**, refer to the rejection of claim 1 and Losehand further discloses using a camera module in a mobile telephone (c. 4, ll. 32-36) or personal digital assistant.

Claim 8 requires a method for manufacturing the camera module of claim 1. Toyoda discloses manufacturing the camera module used in the rejection of claim 1 in paragraphs [0003]-[0008]. Losehand discloses manufacturing the camera module used in the rejection of claim 1 in column 11, line 63 – column 12, line 47 and Figure 14. It would have been obvious to combine these methods to achieve the advantages described above in claim 1.

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda in view of Losehand in further view of US Patent No. 6,795,120 B2 issued to Takagi et al., hereinafter "Takagi".

Regarding **claim 5**, Toyoda in view of Losehand discloses the limitations required by claim 1, including opaque layers. However, Toyoda in view of Losehand does not disclose that the opaque layers are made of blackened metal.

Takagi discloses a camera module (refer to c. 12, I. 55 - c. 14, I. 31 and Figures 21-24) comprising an opaque layer made of blackened metal (c. 13, II. 6-7). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention for an opaque layer to be made of blackened metal as disclosed by Takagi in the camera module disclosed by Toyoda in view of Losehand because metal film evaporation is a widely used and notoriously well-known process in the art of semiconductor manufacturing and metal films are widely used and notoriously well-known light-shield in the art of image sensors.

11. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toyoda in view of Losehand in further view of US Pub. No. 2006/0027740 A1 filed by Glenn et al., hereinafter "Glenn".

Regarding **claim 9**, Toyoda in view of Losehand discloses the limitations required by claim 8, including the various components of the camera module and a method of manufacturing the camera module. However, Toyoda in view of Losehand does not disclose manufacturing the camera module in "stacks", characterized in that there is a plurality of optical elements and, if required a plurality of further components such as a lens are formed in a first stack of disk-shaped bodies, and a plurality of solid-state image sensors are formed in a second stack of disk-shaped bodies, in which the

electrical connections of the solid-state image sensors extend to the lower side of the second stack and part of the first stack is deposited on each image sensor, after which individual camera modules are obtained by separating the second stack of image sensors by means of a dicing operation.

Glenn discloses a method of manufacturing a camera module characterized in that there is a plurality of optical elements and, if required, a plurality of further components such as a lens are formed in a first stack of disk-shaped bodies, and a plurality of solid-state image sensors are formed in a second stack of disk-shaped bodies, in which the electrical connections of the solid-state image sensors extend to the lower side of the second stack and part of the first stack is deposited on each image sensor, after which individual camera modules are obtained by separating the second stack of image sensors by means of a dicing operation (refer to [0140]-[0145] and Figure 8). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture the camera module disclosed by Toyoda in view of Losehand using the stack method disclosed by Glenn because bonding/adhering wafers/components/stacks is a common and well-known practice in semiconductor fabrication.

Regarding **claim 10**, refer to the rejection of claim 9 and Glenn further discloses using a pick-and-place machine (the MRSI 505) to align components after a dicing operation ([0138]). Further, both dicing and alignment via a pick-and-place machine are industry standard techniques in semiconductor fabrication. Therefore, it

would have been obvious to deposit on a first stack ("lens stack") on a second stack ("image sensor stack") after dicing operations using a pick-n-place machine.

Regarding **claim 11**, refer to the rejection of claim 9 and Glenn further discloses that the first stack is aligned with and mounted on the second stack and the first optical elements, any additional optical components and the image sensors, are separated via a single dicing operation (refer to [0142]-[0145]).

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RICHARD M. BEMBEN whose telephone number is (571)272-7634. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RMB

/Sinh Tran/
Supervisory Patent Examiner, Art Unit 2622

